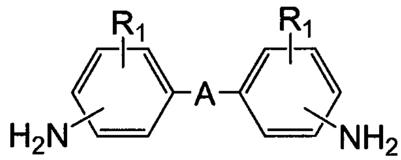
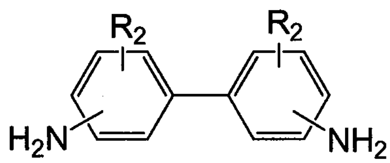
AMENDMENTS TO THE CLAIMS

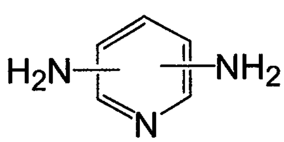
1. (Currently amended) An electrolyte membrane comprising a porous substrate, wherein pores of the substrate are filled with a first polymer having proton conductivity, and the porous substrate consists of [[a]] the polyimide~~, which is obtained from~~ reaction product of a biphenyltetracarboxylic acid ~~dianhydrides as tetracarboxylic acid components and diamines~~ dianhydride and a diamine selected from the group consisting of~~ diamines represented by following general formulae (1) to (3)~~:



(1)



(2)



(3)

wherein the porous substrate has a network structure ~~which is composed~~ of polymer phase and void phase inside thereof, [[and]] forming microscopic continuous holes, and wherein the porous substrate has a porous structure in both surfaces,

wherein the porous substrate has an average pore diameter of 0.01 to 1 μm, and

wherein the porous substrate has a heat resistant temperature of 200°C or higher and a thermal shrinkage ratio of ±1% or less [[upon]] after thermal treatment at 105°C for 8 hours.

2-3. (Canceled)

4. (Previously presented) The electrolyte membrane according to claim 1, wherein the porous substrate has a porosity: 20 to 80%, and a thickness: 5 to 300 μm.

5-6. (Canceled)

7. (Previously presented) The electrolyte membrane according to claim 1, wherein one end of the first polymer is bound to the inner surface of the pores of the substrate.

8. (Previously presented) The electrolyte membrane according to claim 1, wherein the pores of the substrate are further filled with a third polymer having proton conductivity.

9. (Previously presented) The electrolyte membrane according to Claim 1, wherein the porous substrate has a ratio of change in surface area of about 1% or less between the dry state and the wet state at 25°C.

10. (Original) The electrolyte membrane according to claim 9, wherein the electrolyte membrane has a proton conductivity of not lower than 0.001 S/cm and not higher than 10.0 S/cm at 25°C and 100% humidity.

11. (Previously presented) A fuel cell comprising the electrolyte membrane according to claim 1.

12. (Previously presented) A solid polymer fuel cell comprising the electrolyte membrane according to claim 1.

13. (Previously presented) A direct methanol solid polymer fuel cell comprising the electrolyte membrane according to claim 1.

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14. (Currently amended) A method for producing an electrolyte membrane that comprises a porous polyimide substrate filled with an electrolytic substance, wherein the electrolytic substance is a monomer composing a polymer having proton conductivity and the method has a step of filling the monomer into pores of the substrate and heating the monomer to polymerize the monomer,

wherein the porous polyimide substrate has a network structure that is composed of polymer phase and void phase inside thereof and forming microscopic continuous holes and the porous substrate has a porous structure in both surfaces,

wherein the porous polyimide substrate has an average pore diameter of 0.01 to 1 μm, and

wherein the porous polyimide substrate has a heat resistant temperature of 200°C or higher and a thermal shrinkage ratio of ±1% or less [[upon]] after thermal treatment at 105°C for 8 hours; and

wherein the porous polyimide substrate consists of [[a]] the polyimide ~~that is obtained from~~ reaction product of 3,3',4,4'-biphenyltetracarboxylic acid dianhydride ~~as a tetracarboxylic acid component~~ and oxydianiline ~~as a diamine component~~.

15. (Previously presented) The method according to claim 14, wherein after the step of heating the monomer to polymerize the monomer, the method further repeats the steps of filling and heating at least once.

16. (Previously presented) The method according to claim 14 comprising a combination of the step of heating the monomer to polymerize, and one step selected from the following (X-1) to (X-4) steps or combinations of two steps, or three, or all of these steps, thereby filling the pores of the substrate with the electrolytic substance; and/or after the step of

filling the pores of the substrate with electrolytic substance, and following (Y-1) step and/or (Y-2) step:

(X-1) a step of making the substrate hydrophilic and immersing the substrate in the monomer or its solution;

(X-2) a step of adding a surfactant to the monomer or its solution to produce an immersion solution and immersing the substrate in the immersion solution;

(X-3) a step of reducing pressure in the state that the substrate is immersed in the monomer or its solution;

(X-4) a step of radiating ultrasonic wave in the state that the substrate is immersed in the monomer or its solution; and

(Y-1) a step of bringing the electrolytic substance into contact with both surfaces of the substrate; and

(Y-2) a step of removing the electrolytic substance adhering to both surfaces of the substrate by a smooth material.

17. (Currently amended) A method for producing an electrolyte membrane that comprises a porous polyimide substrate filled with an electrolytic substance, wherein the electrolytic substance is a monomer composing a polymer having proton conductivity and the method comprises a step of adding a surfactant to the monomer or its solution to produce an immersion solution; a step of heating the monomer to polymerize the monomer,

wherein the porous polyimide substrate has a network structure, which is composed of polymer phase and void phase inside thereof and forming microscopic continuous holes, and the porous substrate has a porous structure in both surfaces,

wherein the porous polyimide substrate has an average pore diameter of 0.01 to 1 μm, and

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wherein the porous polyimide substrate has a heat resistant temperature of 200°C or higher and a thermal shrinkage ratio of ±1% or less [[upon]] after thermal treatment at 105°C for 8 hours; and

wherein the porous polyimide substrate consists of [[a]] the polyimide~~, which is obtained from~~ reaction product of 3,3',4,4'-biphenyltetracarboxylic acid dianhydride ~~as a tetracarboxylic acid component,~~ and oxydianiline ~~as a diamine component~~.

18. (Previously presented) The method according to claim 14, wherein the porous membrane is a material which is not substantially swollen by methanol or water.

19. (Previously presented) The method according to claim 14, wherein a radical polymerization initiator is further contained in the monomer.

20. (Previously presented) The method according to claim 14, wherein the electrolytic substance filled in the pores has proton conductivity and is provided with a cross-linked structure by the step of heating the monomer to polymerize.

21. (Previously presented) The method according to claim 14, wherein the electrolytic substance filled in the pores has proton conductivity and is chemically bound to the interface of the porous polyimide substrate by the step of heating the monomer to polymerize.

22. (Previously presented) The method according to claim 14, wherein the electrolytic substance forms an electrolyte membrane having pores filled with the proton conductive polymer.

23. (Canceled)

24. (Currently amended) An electrolyte membrane for a fuel cell,

which comprises a porous polyimide substrate, having an average pore diameter of 0.01 to 1 μm, filled with an electrolytic substance wherein the porous substrate has a network structure composed of polymer phase and void phase inside thereof and forming microscopic continuous holes, and the porous substrate has a porous structure in both surfaces,

having no lower than 0.001 S/cm and no higher than 10.0 S/cm of a proton conductivity at 25°C in 100% humidity; no lower than 0.01 $m^2h/kg\mu m$ and no higher than 10.0 $m^2h/kg\mu m$ of a reciprocal number of methanol permeability at 25°C; and no higher than 1% of a ratio of change in surface area between dry state and wet state at 25°C, and

wherein the porous polyimide substrate has a heat resistant temperature of 200°C or higher and a thermal shrinkage ratio of ±1% or less [[upon]] after thermal treatment at 105°C for 8 hours, and

wherein the porous polyimide substrate consists of [[a]] the polyimide~~, which is obtained from~~ reaction product of 3,3',4,4'-biphenyltetracarboxylic acid dianhydride ~~as a tetracarboxylic acid component,~~ and oxydianiline ~~as a diamine component~~.

25. (Canceled)

26. (Previously presented) An electrolyte membrane-electrode assembly comprising the electrolyte membrane for a fuel cell according to claim 24.

27. (Original) A fuel cell comprising the electrolyte membrane-electrode assembly according to claim 26.

28. (Canceled)

29. (Currently amended) The electrolyte membrane according to Claim 1, wherein the ~~polyimide~~ porous substrate consists of ~~a polyimide, which is obtained from~~ the reaction product

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of 3,3',4,4'-biphenyltetracarboxylic ~~3,3',4,4'-biphenyltetracarbodylic~~ acid dianhydride ~~as a tetracarboxylic acid component,~~ and oxydianiline ~~as a diamine component~~.

30. (New) The electrolyte membrane according to Claim 1, wherein R_1 and R_2 are independently selected from the group consisting of hydrogen, a lower alkyl group, and a lower alkoxy group, and

wherein A is a divalent moiety selected from the group consisting of O, S, CO, SO2, SO, CH2 and C(CH3)2.

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